



Key Stage 4 – Drug trials

Notes for teachers

At a glance

Researchers at The University of Oxford are using a technique called optoporation that involves using infrared lasers to pierce holes in cell membranes in order to deliver drugs directly into a cell.

This lesson is suitable for extending the more able KS4 students when teaching about drug trialling. They will first find out about how drug trials are carried out before applying this knowledge to write a grant application to a research council in order to fund a project into optoporation. Students will also work in groups as members of a review panel and review applications based on criteria.



Learning Outcomes

- Students can describe the stages and functions of a drug trial
- Students apply their scientific knowledge to write and review a grant application

Each student will need

- 1 copy of the pupil worksheet

Possible Lesson Activities

1. Starter activity

- Show the animation 'Shedding Light on the Situation' to the class that outlines a range of research projects being carried out at The University of Oxford.
- Concentrate on the section describing optoporation (1:38 - 1:45). Remind students that the cell



membrane is designed to only let certain molecules through it. Discuss why this is useful for living organisms.

2. Main activity: The stages of drug trialling

- Supply students with copies of page 1 of the pupil worksheet and ask them to read through the sections on 'finding new drugs' and 'stages of a drug trial'.
- Question the class on their understanding. Suitable questions might include: Why do we test new drugs? How long does a typical drug trial take? Why are drugs trials so expensive? Why do the number of substances decrease as the trial continues?
- Ask them to continue to read the section on 'optoporation' which explains the technique shown in the animation in more detail.

3. Main activity: Writing a grant application

- Ask students to work in groups of 3-6 and ask them to read through the task on page 1 of the pupil worksheet. Discuss with the class that scientists usually work in research teams to carry out projects. They will need money which they may decide to get by applying for a grant from a research council.
- Give each student a copy of page 2 of the pupil worksheet. The first section 'writing a grant application' outlines the information which they should include when writing their grant. Groups may decide to split up the work, assigning a student to each section. The grant can be written on pieces of paper or using a computer. If you have access to Google Documents groups can use this to collaborate on one document. They should think about how optoporation can benefit drug trialling and therefore the development of new drugs to treat conditions such as cancer. For example, it could increase the number of compounds that make it to clinical testing and in turn the probability of discovering new drugs.

4. Main activity: Reviewing a grant application

- Discuss with the class how many points out of 16 they think qualifies as a successful application. Ask groups to pass on their finished application to another group for review.
- Groups should then fill in the table on page 2 of the pupil worksheet to review the application. Each criterion is given a score out of 4 with specific feedback. Groups should then write overall feedback.
- Allow groups to read the feedback of their grant.

5. Plenary

- Ask the class who got a successful application. For those groups who didn't, ask them to reflect within their group what they could improve on.
- Discuss as a class the fact that getting funding is a real part of being a scientist - do they think it's important or should research groups get money automatically? Can they see any problems with applying and awarding money to scientists in this way?